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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/778,221	02/06/2001	Doron Burshtein	TI-29681A	5734

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EXAMINER	
ODOM, CURTIS B	

ART UNIT	PAPER NUMBER
2634	

DATE MAILED: 02/16/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/778,221	BURSHTEIN ET AL.	
	Examiner	Art Unit	
	Curtis B. Odom	2634	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 January 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3 and 13-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3 and 13-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *06 February 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ramaswamy et al. (previously cited in Office Action 5/5/2005) in view of Brehmer et al. (U. S. Patent No. 5, 251, 236).

Regarding claim 3, Ramaswamy et al. discloses a method for improved shell mapping comprising:

providing (column 10, line 10-column 11, line 48) a non-square grid QAM constellation and employing points of the constellation in the mapping, wherein the constellation is at least one of 8QAM constellation (column 2, lines 46-56), wherein 2^3 (odd power of 2) is 8QAM. However, Ramaswamy et al. does not disclose the constellation is at least one of a 13QAM constellation.

Brehmer et al. discloses that normally QAM constellations include a number of points in the constellation to be equal to a power of 2 (2^3 is 8QAM) (column 1, lines 16-21). Brehmer et al. further discloses that in the case of encountering propagation (line) impairments, the data rate and bandwidth of the signal may be held constant by reducing the number of bits in the

constellation (bits per baud) (column 1, lines 27-30). Brehmer et al. discloses that the reduced number of points may be other than an integer power of 2, therefore a non-integer or fractional number of bits are transmitted per baud (column 1, lines 33-37). A 13QAM constellation contains a number of reduced points (with regards to a 16QAM constellation) which includes a fractional number of bits per baud ($2^{3.6} = 13$, wherein 3.6 is the number of bit per baud for a 13QAM constellation). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to create a 13 QAM constellation of reduced/fractional bits in Ramaswamy et al. as taught by Brehmer et al. since Brehmer et al. states that this reduced constellation compensates for reliability lost due to the line impairments (column 1, lines 27-37).

3. Claims 16-18 and 19-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ramaswamy et al. (previously cited in Office Action 5/5/2005) in view of Brehmer et al. (U. S. Patent No. 5, 251, 236) and in further view of Kennard et al. (previously cited in Office Action 5/5/2005).

Regarding claims 16-18, which inherit the limitations of claim 3, Ramaswamy et al. and Brehmer et al. do not disclose the 8QAM and 13QAM constellation points are selected from a group of points recited in the claims.

However, Ramasway et al. discloses symbols are mapped to constellation points closest in distance to the symbols (column 9, lines 46-58). Kennard et al. further discloses arranging a constellation wherein points are spaced in the phase plane as far apart as possible to provide the greatest SNR ratio, hence an improved noise margin (column 1, lines 34-39). Therefore, it would have been obvious to one skilled in the art at the time the invention was made that constellation points are chosen based on the symbols/bits to be transmitted and points are

selected in the phase plane as far apart as possible to provide the greatest SNR ratio. Thus, simply choosing constellation points does not constitute patentability.

Regarding claims 19-22, which inherit the limitations of claims 16 and 17, Ramaswamy et al. further discloses implementing a mapping table using 5 bit words for I and Q axis (column 11, lines 49-61); 3 bits for I-axis and 2 bits for Q axis (column 9, lines 37-58); and 4 bit words for I and Q axis (column 9, lines 1-36, 4-bit binary representation). Ramaswamy et al. does not specifically disclose the mapping table includes the specific points recited in the claims.

However, Ramasway et al. discloses symbols are mapped to a plurality constellation points stored in random access memory (column 9, lines 37-56). Ramaswamy et al.also discloses symbol/bits are mapped to one of the plurality constellation points closest in distance to the symbols. Kennard et al. further discloses arranging a constellation wherein points are spaced in the phase plane as far apart as possible to provide the greatest SNR ratio, hence an improved noise margin (column 1, lines 34-39). Therefore, it would have been obvious to one skilled in the art at the time the invention was made that the random access memory of Ramaswamy et al. and Brehmer et al. could have included any one of a plurality of constellation points in order to map the symbols to the closest constellation point and improve SNR (as taught by Kennard et al.). Thus, simply storing particular constellation points does not constitute patentability.

4. Claims 1, 2, and 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ramaswamy et al. (previously cited in Office Action 5/5/2005) in view of Brehmer et al. (U. S. Patent No. 5, 251, 236) in further view of Kennard et al. (previously cited in Office Action 5/5/2005) and in further view of Paik et al. (previously cited in Office Action 5/5/2005)

Regarding claims 1 and 2, Ramaswamy et al. discloses generating a QAM constellation, comprising:

arranging (column 10, line 10-column 11, line 48) constellation points in a non-square grid, wherein the constellation is at least on of 8QAM constellation. Ramaswamy et al. does not disclose the constellation is at least one of a 13QAM constellation; the constellation is arranged to achieve a large noise margin and to allow for fast convergence of blind equalization algorithms.

Brehmer et al. discloses that normally QAM constellations include a number of points in the constellation to be equal to a power of 2 (2^3 is 8QAM) (column 1, lines 16-21). Brehmer et al. further discloses that in the case of encountering propagation (line) impairments, the data rate and bandwidth of the signal may be held constant by reducing the number of bits in the constellation (bits per baud) (column 1, lines 27-30). Brehmer et al. discloses that the reduced number of points may be other than an integer power of 2, therefore a non-integer or fractional number of bits are transmitted per baud (column 1, lines 33-37). A 13QAM constellation contains a number of reduced points (with regards to a 16QAM constellation) which includes a fractional number of bits per baud ($2^{3.6} = 13$, wherein 3.6 is the number of bit per baud for a 13QAM constellation). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to create a 13 QAM constellation of reduced/fractional bits in Ramaswamy et al. as taught by Brehmer et al. since Brehmer et al. states that this reduced constellation compensates for reliability lost due to the line impairments (column 1, lines 27-37).

Kennard discloses arranging a constellation wherein points are spaced in the phase plane as far apart as possible to provide the greatest SNR ratio, hence an improved noise margin

(column 1, lines 34-39). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the method of Ramaswamy et al. and Brehmer et al. with the teachings of Kennard et al. and to space points in the phase plane as far apart as possible to improve noise margin, thus improving SNR.

Paik et al. also discloses that the speed of the convergence is based on the errors in a received constellation (column 8, line 42-column 9, line 12). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made that by spacing points in the phase plane as far apart as possible to provide the greatest SNR ratio, hence improving the noise margin for the constellation, that a received constellation would contain reduced errors, leading to a faster convergence. Thus, claim 1 does not constitute patentability.

Regarding claim 2, which inherits the limitations of claim 1, Kennard et al. discloses selecting constellation points with low word widths (column 4, line 63-column 5, line 64). It would have been obvious to one skilled in the art at the time the invention was made that using constellation points with low word widths would allow the points in the phase plane to be spread apart as far apart as possible, thus optimizing SNR.

Regarding claims 13-15, Ramaswamy et al., Brehmer et al., Kennard et al., and Paik et al. do not disclose selecting 8QAM/13QAM constellation points from the listed points recited in the claims. However, it would have been obvious to one skilled in the art at the time the invention was made to select points in the phase plane as far apart as possible to provide the greatest SNR ratio (see Kennard et al., column 1, lines 34-49). Thus, the selection of constellation points does not constitute patentability.

Conclusion

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Curtis B. Odom whose telephone number is 571-272-3046. The examiner can normally be reached on Monday- Friday, 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh Fan can be reached on 571-272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Curtis Odom
February 7, 2006

CHIEH M. FAN
SUPERVISORY PATENT EXAMINER